2005 GYIBC ANNUAL REPORT

(June 30, 2005 - June 30, 2006)

Written by members of the Executive Committee, Technical, and Information Education Subcommittees

GYIBC

Greater Yellowstone Interagency Brucellosis Committee

Idaho Department of Fish and Game • Montana Department of Fish, Wildlife and Parks • Wyoming Game and Fish Department • Idaho Department of Agriculture
Montana Department of Livestock • Wyoming Livestock Board • U.S.D.A. Forest Service • U.S.D.A. Animal and Plant Health Inspection Service • U.S.D.A. Agricultural Research Service
U.S.D.I. Fish and Wildlife Service • U.S.D.I. National Park Service • U.S.D.I. Bureau of Land Management • U.S.D.I. National Biological Service

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GOAL, MISSION, AND OBJECTIVES OF THE GREATER YELLOWSTONE INTERAGENCY BRUCELLOSIS COMMITTEE (GYIBC)

GOAL: It is the Goal of the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) to protect and sustain the existing free-ranging elk and bison populations in the Greater Yellowstone Area (GYA) and protect the public interests and economic viability of the livestock industry in Wyoming, Montana and Idaho.

MISSION: Toward this end it is the Mission of the GYIBC to facilitate the development and implementation of brucellosis management plans for elk and bison in the GYA.

OBJECTIVES: This will be accomplished by subscribing to the following management Objectives which will, in turn, guide the GYIBC;

- Recognize and maintain existing state and federal jurisdictional authority for elk, bison and livestock in the GYA;
- Maintain numerically, biologically and genetically viable elk and/or bison populations in the respective states, national parks and wildlife refuges;
- Maintain the brucellosis-free status of Wyoming, Montana and Idaho and protect the ability of producers in the respective states to freely market livestock;
- Eliminate brucellosis-related risks to public health;
- Eliminate the potential transmission of Brucella abortus among elk, bison and livestock;
- Coordinate brucellosis-related management activities among all affected agencies;
- Base brucellosis-related management recommendations on defensible and factual information while encouraging and integrating new advances and technology;
- Aggressively seek public involvement in the decision making process;
- Communicate to the public factual information about the need to prevent the transmission of brucellosis, the need for its eradication and the rationale for related agency management actions; and
- Plan for elimination of Brucella abortus from the GYA by the year 2010.

Executive Summary

This annual report is intended to provide the reader the highlights of GYIBC activities as well as research and planning efforts of member agencies. This Executive Summary is intended to further summarize the report, by highlighting significant points from each author(s).

Currently the states are in the process of reviewing a "federal" draft review of the **Memorandum of Understanding (MOU)**. When they agree upon a draft, additional review by the federal agencies and negotiations between the state and federal agencies will ensue.

Preliminary results from the **spatial dynamics of elk in the Upper Madison** study indicate that many of the elk herds in southwest Montana overlap to some degree at during the year. Yearlong and calving range locations are presented for seven elk herds and brucellosis management implications for these movements are detailed.

The **bison quarantine feasibility study** continued this past year and researchers continued serologic testing at the facility. Bison were bled for a second time in June 2006, with no seropositives. Culture tests from 48 bison selected for slaughter await. Agencies are in the process of conducting an Environmental Assessment (EA) for Phase II/III of the project.

Wildlife researchers in northwest Wyoming have been studying transmission risks of brucellosis. This study looks at the impact of **scavenging rates of aborted fetuses,** as well as whether the disease is density dependent in feedground conditions. Analyses of their data led to a recommendation by Wyoming Game and Fish Department to not control predators within a 2-mile radius of any feedgrounds. Scientists are also looking at the role parasites may play in brucellosis infection rates as well as examining the **ecology and epidemiology of elk** on Wyoming's feedgrounds.

B. abortus isolates are being used for a study using HOOF-Print **DNA fingerprinting techniques** to analyze Brucella strains in feedground elk. Researchers plan to develop a new diagnostic real-time PCR assay that can identify brucellosis in animal tissues.

Preliminary results to a vaccination study indicate that using a **photopolymerization encapsulation** technique causes very little mortality of B. abortus. The use of bio-bullets to deliver this vaccine is examined in this article.

Idaho **lost its brucellosis Class-Free status** on January 12, 2006. The infected cattle herd was found near Swan Valley, Idaho. The events that led up to the loss of status and the ensuing regulatory changes and recommendations for addressing the brucellosis issue in eastern Idaho are illustrated.

WGFD implemented the first year of the **test-and-removal pilot project** as recommended by the Governor's Brucellosis Coordination Team. In the first year of the 5-year experiment, 58 seropositive elk were slaughtered, costing an estimated $5,911 per elk.

The **Interagency Bison Management Plan** (IBMP) partners have completed the sixth season of operation. During the time reported in this annual report, significant actions have taken place involving the IBMP, including the implementation of a hunting season for bison and large scale activities to reduce brucellosis transmission risk. Within this Annual Report, several articles are contributed from member agencies of the IBMP. A draft Environmental Impact Statement (EIS) is out for review involving a **park-wide remote delivery vaccination program** for bison in Yellowstone National Park. Also included is a report on the **Montana bison hunt and information and education efforts** that took place in the past year.

The three states in the GYA and APHIS have begun using **risk assessment matrix** questionnaires. Each state has its own cattle brucellosis surveillance program that addresses the types of livestock operations as well as the state's Brucellosis status. The **GYIBC Serology Working Group** will present its recommendations for final review and approval at the next meeting of the GYIBC technical subcommittee.

Montana had previously reported an increase in **brucellosis seroprevalence for elk in southwest Montana**. After further investigation it was found that Yersinia antibodies were yielding false positive results. Further investigation of the epidemiological significance of Yersinia is planned for the future. Montana also continued surveillance in bison and bears.

WGFD **Brucellosis-Feedground-Habitat (BFH) program**, trapped or darted a total of 531elk that were tagged and had biological samples taken, including serum from 318 test eligible females, during the 2005 trapping season. A total of 2,859 elk calves were vaccinated at 19 state feedgrounds, and 909 calves were vaccinated on the National Elk Refuge. This group is also responsible for the development of Brucellosis Management Action Plans (BMAP's), which were the top recommendation from the Governor's Brucellosis Coordination Team.

The Grand Teton and National Elk Refuge **bison and elk management plan and EIS** is anticipated to be completed by late spring of 2007. The Draft Management Plan and EIS completed a public review in 2005 and also received over 11,900 written comments and public testimony.

United States Animal Health Association (USAHA) held a workshop to examine brucellosis vaccine research, delivery, and live animal diagnostic capabilities in 2005. The symposium compiled a technical report, as well as a roadmap for improved vaccines, vaccine delivery, and testing for brucellosis, which is highlighted in this Annual Report.

There were fewer opportunities for public participation in 2005. The **Information and Education Subcommittee** continues to distribute news on brucellosis through the "GYIBC News," via email to constituents throughout the GYA. This annual report is the third produced by the committee, which continues to be an excellent vehicle for exchange of knowledge between state and federal agencies and to present this information to the public and interested stakeholders of the brucellosis dilemma.

Memorandum of Understanding: Status Report

Bob Moon, Tom Linfield, and Jose Diez

The Greater Yellowstone Interagency Brucellosis Committee (GYIBC) was formally established in 1995 when the enabling Memorandum of Understanding (MOU) was signed by the Governors of Idaho, Montana, and Wyoming and Secretaries of the U.S. Departments of Interior and Agriculture. The MOU established the framework for the state and federal agencies with jurisdiction and management responsibilities over livestock, wildlife, and habitat resources to address the issues relevant to brucellosis in the Greater Yellowstone Area (GYA). The MOU was intended to be a dynamic agreement among the member agencies, with a term of five years, and subject to review and renewal. Recognizing the need to renew the MOU so that cooperative and coordinated interagency efforts to address the complex GYA brucellosis issue could continue, the GYIBC Executive Committee formed an ad hoc subcommittee in September 2003 to review and provide recommended revisions to the MOU.

The ad hoc subcommittee reviewed the MOU and developed a revised draft MOU, which they presented to the Executive Committee in January 2004. The most significant proposed revisions included: (1) Native American Tribal representation on the GYIBC, appointing the President of the Board of Directors of the InterTribal Bison Cooperative (ITBC) as the Tribal representative on the Executive Committee; and (2) stronger and more explicit commitment to elimination of brucellosis in the GYA, including the development of Cooperative Brucellosis Elimination Plans by the Technical Subcommittee. The Executive Committee reviewed the draft MOU and suggested additional revisions, which were subsequently agreed upon in September 2004, resulting in a final revised draft MOU.

The final revised draft MOU was provided to the respective agencies for further review, including verification of consistency with agency directives, jurisdictions, format, and legal content, resulting in additional proposed revisions. In May 2005, the U.S. Departments of Interior and Agriculture agreed upon a "federal" draft MOU for the States of Idaho, Montana, and Wyoming to consider. The "federal" draft MOU included additional provisions focusing on efforts to eliminate brucellosis from bison and elk in the GYA, including: (1) necessary agency development of adaptive management disease elimination plans for each affected bison or elk herd unit or population; (2) establishment of measures to evaluate incremental progress in disease elimination efforts; and (3) timelines for plan development and progress evaluation. The States are in the process of reviewing and analyzing the "federal" draft MOU, and as of August 1, 2006, agreement on a "state" draft MOU, if different than the "federal" draft MOU, had not been reached. Conferencing among the states is anticipated in hopes of arriving at an agreed upon "state" draft MOU. If the "state" draft MOU differs from the "federal" draft MOU, additional review by the federal agencies and negotiations between the state and federal agencies to resolve any differences will be necessary before a final revised MOU can be signed.

Spatial Dynamics of Elk in the Upper Madison

Keith Aune and Ken Hamlin

Rationale, objectives, and methods for this project were presented in the 2004 GYIBC Annual Report. Here, we present preliminary results through June 2006. Results related to serology and brucellosis status of elk captured during 2005 and 2006 as well as sampling of hunter-killed elk during previous years are presented elsewhere in this Annual Report.

Of the 20 GPS radio-telemetry collars deployed on female elk during 2005, one was a probable capture-related mortality, one malfunctioned and "blew-off" after only a month, and the remaining 18 functioned until programmed "blow-off" time in late January 2006. We have not been able to relocate one collar, but retrieved the 17 others and they performed exceptionally well. Sixteen of the transmitter obtained from 95-98% of all possible locations during the 49-week period, averaging about 16,500 locations each. One transmitter started malfunctioning after July, obtaining only about 55% of possible locations after that for a total of about 13,000 locations. Together, about 280,000 locations were obtained for the 17 female elk during mid-February 2005 through late January 2006.

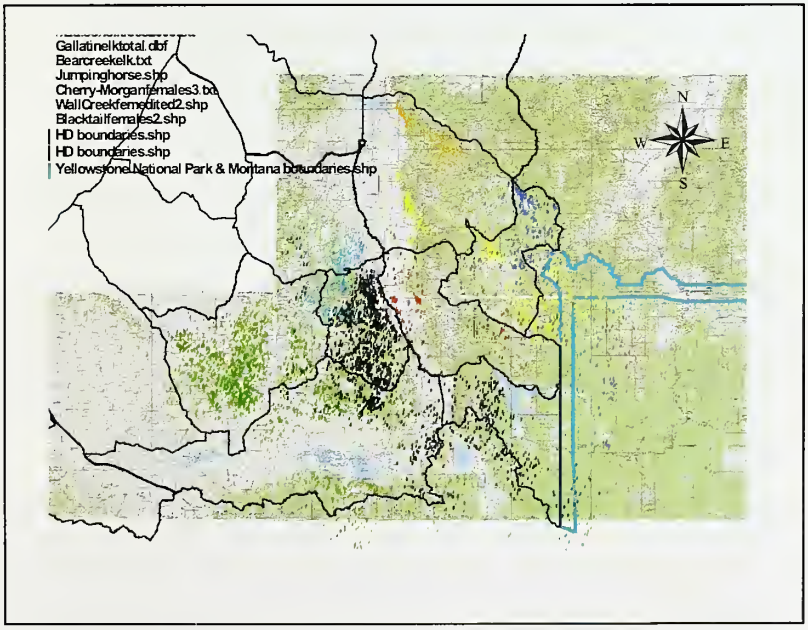


Figure 1. Yearlong distribution for 7 elk herds associated with the northwestern portion of Yellowstone National Park. Based on VHF locations only and each color represents a different herd range.

On 20 and 21 February 2006, we captured 29 adult females and fitted them with GPS transmitter-collars that are scheduled to "blow-off" 52 weeks from that date. Two adult males were fitted with VHF transmitter-collars. These GPS transmitter-collars will be retrieved in late February 2007 and the data downloaded. The graduate student should finish by June 2007 and these data will also be available for a variety of other uses.

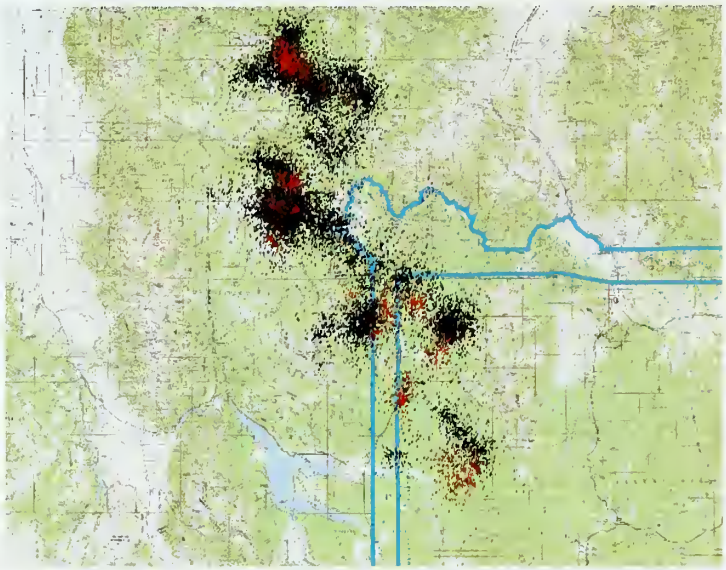


Figure 2. Yearlong herd range (black dots) and calving period (20 May – 15 June) locations (red dots) for the "traditional" Gallatin elk herd.

Some previous information is available on elk herd ranges and distribution in southwestern Montana (Hamlin and Ross 2002). Recently, MFWP has compiled raw telemetry data collected during 1976-84 in the Gallatin and Madison drainages (Cada and Taylor, unpublished) to add to the regional database and has been expanding their knowledge of elk distribution in southwestern Montana as part of research studies of both wolf-ungulate interactions and brucellosis interactions in the GYA.

The general yearlong ranges for 7 elk herds [(Gravelly-Snowcrest: Wall Creek, Blacktail, and Cherry-Morgan); (Madison: Jumping Horse, Bear Creek, and Sun Ranch); and (Gallatin)] (Figure 1) indicate that at least some degree of overlap at some time of the year occurs among all 7 elk herds. Portions of 5 of the herds use Yellowstone National Park during summer and fall.

Further, the 3 Gravelly-Snowcrest elk herds illustrated all have some degree of overlap with 7 other Gravelly-Snowcrest elk herds and the Sand Creek elk population in Idaho (Hamlin and

Ross 2002). Through immigration and emigration, these populations also have had interchanges with elk populations near Jackson Hole, Wyoming (Hamlin and Ross 2002).

The herd ranges portrayed in Figure 1 were obtained by relatively infrequent relocations with VHF transmitter-collared elk, but probably accurately portray herd ranges because they were obtained over relatively long periods of time from many elk. Herd range will be more completely defined for the Madison/Sun Ranch herd (red dots in Figure 1) with additional information from 29 adult female elk next year. Over the next several years, MFWP also will attempt to collect similar distributional information using GPS technology for that portion of the Northern Range elk herd that winters north of Yellowstone National Park, including those near Dome Mountain.

Calving season locations (20 May- 15 June in these examples) indicate that the "traditional" segment of the Gallatin elk herd (Figure 2) and the segment that migrates through the Gallatin to winter on the Bear Creek Wildlife Management Area and Sun Ranch (Figure 3) have both shared and dissimilar calving areas. Thus, implications for brucellosis management may vary even within segments of what was traditionally viewed as one elk herd.

Preliminary indications from the 17 GPS transmitter-collars deployed in 2005 are that there are at least 2-3 different migrating segments for the Sun Ranch/southern Madison Valley elk herd. These segments have different timing and patterns of spring and fall movements and different summering areas. Additional information provided by the 29 elk equipped with transmitters in February 2006 will help clarify this question.

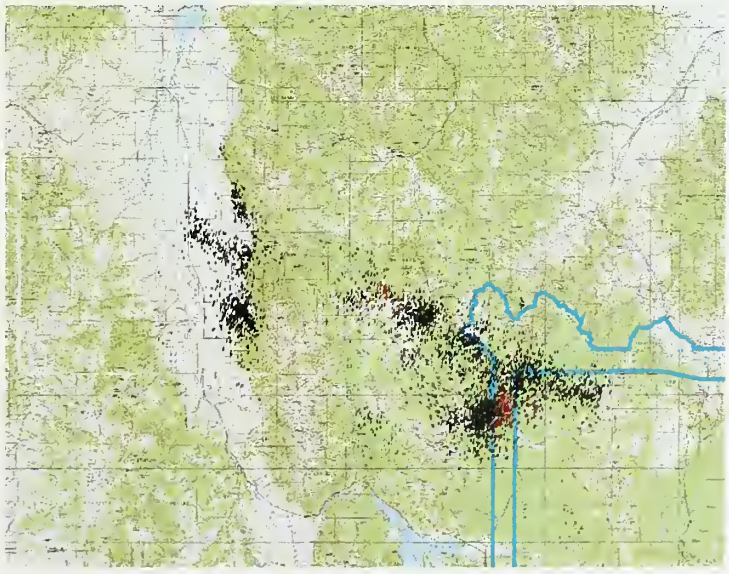


Figure 3. Yearlong herd range (black dots) and calving period (20 May – 15 June) locations (red dots) for the segment of the Gallatin elk herd that migrates to the Bear Creek Wildlife Management Area and the Sun Ranch to winter.

More intensive information collected via 30 minute interval GPS radio-transmitter collars on the Sun Ranch elk herd has allowed even more detailed information to be collected for calving area locations (Figure 4) or other periods of interest. At projects end, the additional 29 female elk will provide similar intensive information for this elk herd. When more intensively analyzed, this GPS data will allow more precise determination of elk distribution during periods of potential brucellosis transmission and determine timing of overlapping distribution with other elk herds and other species such as bison and domestic livestock. The information gathered may be useful in designing management plans for elk, bison, and livestock that reduce potential for transmission of brucellosis.

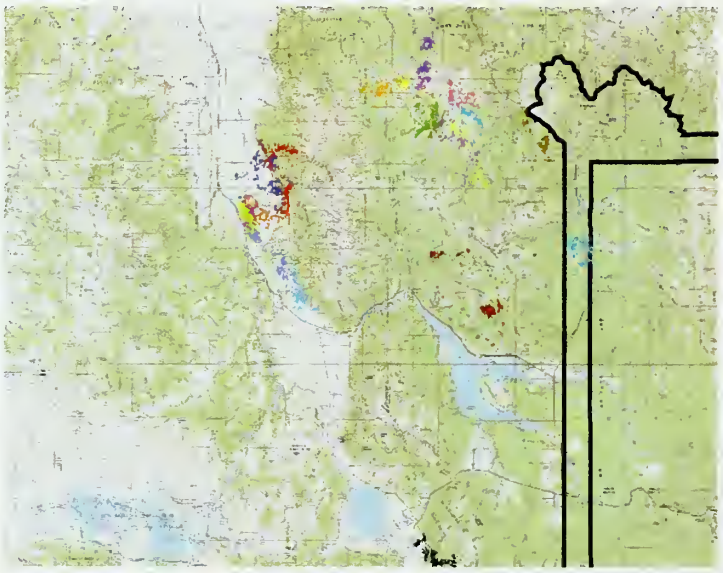


Figure 4. Calving area locations (20 May – 15 June) for 17 adult female elk captured on the Sun Ranch area in February 2005 and marked with 30-minute interval GPS radio-transmitter collars. Each color represents a different adult female elk.

Bison Quarantine Feasibility Study- Environmental Analysis and Project Update

Keith Aune and Jack Rhyan

Often during the winter and spring bison migrate from YNP into Montana. Migrating bison use areas that include national forest system lands and private grazing lands primarily during the late spring and summer periods. Federal and State agencies seek to minimize the risk of brucellosis transmission from bison to livestock on these grazing lands.

The Interagency Bison Management Plan (IBMP) was approved in 2000. The IBMP did not include specific provisions to establish a bison quarantine facility. However, it did consider whether a quarantine facility would be an appropriate component of the plan and concluded that bison removed from the population could be used for approved research or sent to quarantine. It also indicated that further environmental review would be completed to determine the design, location and operation parameters for a bison quarantine facility. In 2004, MFWP in cooperation with USDA/APHIS proposed to specifically address quarantine by conducting Phase I of a bison quarantine feasibility study. A Draft EA that assessed the impacts of three alternatives for Phase I was offered for public review on October 12, 2004. A decision notice to proceed with the quarantine feasibility study was signed in January 2005. The preferred alternative proposed using a privately owned game farm facility north of Gardiner to conduct Phase I of the study.

Bison Awaits transport. *Photo by Mark Atkinson*

An Environmental Analysis for Phase II/III of the quarantine feasibility study was offered for public review on December 12, 2005. Initially, the agencies scheduled a public meeting in Bozeman on December 19 and requested that comments be submitted by January 13, 2006. During the comment period, the agencies received requests for additional public meetings and extensions to the public comment period. The public comment period was finally closed on February 27, 2006. A total of 68 people attended three public meetings. MFWP also received 210 comments, via postal mail and email, in response to the draft Environmental Assessment. A final decision to implement Phase II/III of the quarantine feasibility study was published in June 2006. The preferred alternative included developing a second quarantine facility for Phase II animals. The site preferred was a property leased from a private individual a few miles north of the Brogan facility. The EA's and Decision Notices produced during this study are available on the MFWP website at: http://www.fwp.mt.gov/publicnotices.

Following the decision to proceed with Phase I of the bison quarantine feasibility study the former Brogan game farm was refitted to accommodate quarantined bison from YNP. In August 2005 fencing contractors completed additional interior fencing to provide the double fence buffer necessary for quarantine. Exterior fences were upgraded in the lower pastures only in fall 2005 and additional fence design was planned for the upper pastures to complete improvements through 2006. Following a decision to proceed with Phase II/III lease agreements will be finalized and fencing contracts completed. Facility construction will begin this summer at the Slip n'Slide Ranch where two quarantine pens will be double fenced to house each of two test groups.

Bison in quarantine facility. *Photo by Mark Atkinson*

The first bison calves available for quarantine (17) arrived in late March and April 2005 while the majority of the calves (86) arrived in early winter 2006. All bison captured during operations by agencies implementing the IBMP were screened using two field tests including the card and FPA. Blood collected at that time was also submitted to the Montana Diagnostic Laboratory or the National Veterinary Services Laboratory to complete remaining confirmatory tests. Occasionally, animals were brought into the facility on initial negative screening tests from the field but failed to qualify on other known serologic tests in the experimental test panel established for this study. After final screening of the bison transported into the facility 101 bison met the initial criteria for acceptance into the quarantine program (Table 1).

Of the 103 bison transported into the Brogan Bison Research Facility, 39 were males and 64 were females. After the initial field screening and with subsequent testing, 2 males and 5 females were disqualified from the project. The remaining 96 bison qualified for participation through Phase I of the study and were composed of 37 males and 59 females. All animals screened out of the study using the approved test procedures were found to be positive on more than one standard serologic test. Six of the seven animals screened through this protocol and eventually slaughtered were tissue culture positive. No bison was blood culture positive during phase I of this study.

Table1. Summary of serologic testing of bison transported into the Brogan Bison Research Facility, 2005-2006

Year	No. Bison Transported to Quarantine	No. Bison Failing Assurance Tests	No. Bison Testing Negative once	No. Bison seroconverting after arrival to the Brogan Facility	% Seroconverting	No. Bison Remaining Negative
2005	17*	1	16	2	12.5	14
2006	86*	1	85	3	3.5	82
TOTAL	103	2	101	5	4.9	96

* Test negative on the field card and FPA tests only

In June 2006 the 96 quarantine bison were bled a second time and none were classified sero-positive. 48 of these bison were randomly selected from the population for slaughter and culture. Tissue culture results are pending from those slaughtered animals. The remaining 48 animals were sorted into test groups to continue the study. Eight males, 4 one year olds and 4 two year olds, were sorted into one male test group and separated from the females to prevent premature reproduction. The remaining females were sorted into two test groups of 20 females each and put into pastures that are double fenced to keep groups separated. These female test groups will remain isolated from each other throughout Phase II of the study. Bulls will be put within each test group during the breeding phase of the project next summer.

Risk of Brucellosis Transmission in Feedground Elk: Density-Dependent, Frequency-Dependent and Scavenging Factors

Eric J. Maichak and Brandon M. Scurlock

Risk of transmission of numerous wildlife diseases is related to the density of host populations. Some wildlife diseases are likely frequency-dependent, i.e., transmission is influenced by how many times the susceptible host organism contacts the infectious agent. In western Wyoming, 22 state-operated winter feedgrounds and the National Elk Refuge concentrate elk in relatively high densities. These concentrations occur from January to April, and partially overlap with the period of brucellosis transmission risk (5-February to 15-June). Brucellosis seroprevalence of elk on (26%) and adjacent to (2%) winter feedgrounds in western Wyoming suggest that the disease is maintained in "feedground elk" because of increased densities and associated frequency that elk contact Brucella contaminated exudates. Also, scavengers on and adjacent to feedgrounds likely reduce the time that fetuses remain on feedgrounds. Although there is anecdotal evidence that transmission of brucellosis in feedground elk is density-dependent, no study has quantified if transmission risk is density-dependent, or if transmission risk is influenced by scavenging rate of aborted fetuses.

A coyote removes a fetus from Franz feedground. Photo by Eric Maichak

During March 2005, we placed 6, culture-negative elk "fetal units" (fetus and placenta) on Franz feedground at locations of varying density (feedline, high-traffic, low-traffic). Data suggested that total animals "investigating" (sniffing) and contacting pseudo-aborted fetal units increased from low-traffic to feedline sites, but that total investigations and contacts and total time spent investigating the fetal unit per animal did not differ among sites. All fetal units were consumed within 14.9hr (±SE = 4.3hr) of placement on the feedground with golden eagles and coyotes consuming the majority. These data suggest that transmission of brucellosis on feedgrounds is density-dependent, but risk of transmission is likely reduced by scavengers.

During March and early April 2006, we expanded this project by distributing 33, culture-negative fetal units among 5 study sites (feedgrounds – Franz, Muddy Creek, Soda Lake, Grey's River, non-feedground – Buffalo Valley) in western Wyoming. We also expanded our methods to include more locations of varying density (feedline, high-traffic, low-traffic, off-feedground, non-feedground) and an index of density (elk within 5m of fetus/10min). Preliminary analyses from data pooled among sites indicate no differences between adult females and juveniles for all data collected. Density of elk/10min, relative percent of elk investigating and contacting fetal units, and average time, investigations, and contacts per elk per fetal unit varied among all sites ($F_{4, 33}$ = 5.49 to12.56, $P < 0.001$); generally, all measures were highest in feedline and/or high-traffic locations and much lower in all others. Density of elk among sites was correlated positively with relative percent of elk investigating and contacting fetal units (R^2 = 53.4, 36.8, respectively; $P < 0.001$) and average contacts per elk (R^2 = 12.3, $P = 0.03$), but was not correlated with average time or investigations. On all sites, mass and internal temperature of fetal units were not co-variables of scavenging rate. On feedgrounds, scavenging rate did not vary among sites and was not correlated with density. Although not significantly different, scavengers removed fetal units from feedground sites faster (mean = 18.98hr, ±SE = 2.38hr) than the non-feedground site (mean = 33.37hr, ±SE = 7.04hr).

Our data support the theory of density-dependent, intraspecific transmission of brucellosis among feedground elk. Risk of transmission would likely be reduced by preventing concentration of animals on feedgrounds. Further analyses of these data may elucidate if frequency-dependent factors (e.g., average investigations or contacts per elk per fetal unit) are influencing risk of transmission. Ultimately, WGFD has instituted a "no predator control" policy for all agency personnel working with feedgrounds, a practice that should maintain or improve fetus scavenging rates. This study has been graciously assisted by WGFD, University of Wyoming, and Iowa State University personnel, and will likely continue for one to two more years.

Ecology and Epidemiology of Elk Brucellosis

Paul C. Cross, Scott Creel, William H. Edwards, Vanessa Ezenwa, Eric Maichak, Brandon Scurlock, and Jared Rogerson

The average seroprevalence of brucellosis in elk that are artificially fed on the Wyoming feedgrounds is 20% while elk populations in other regions of the Greater Yellowstone Ecosystem (GYE) tend to have a seroprevalence of less than 5%, and elk outside GYE are not known to sustain the disease. Although there are clear differences between elk using feedgrounds and unfed elk populations the mechanisms driving the elevated seroprevalence is unknown. We are pursuing two research avenues that may generate insight into possible mechanisms as well as some of the potential confounding factors that may allow for alternative management strategies. First, we are conducting statistical analyses on Wyoming Game and Fish Department (WGFD) data to determine which factors are associated with higher brucellosis prevalence among the elk feedgrounds. Secondly, we are also conducting pilot studies on the role that stress and intestinal parasites may play in the susceptibility of elk to brucellosis.

Our analyses of WGFD testing data indicate that there is large variation among feedgrounds with respect to their prevalence, number of elk fed, and the length of feeding season. We found that longer feeding seasons were directly correlated with higher brucellosis seroprevalence on each feedground ($r^2 = 0.61$; Fig 1A; Cross et al. in review), while elk

A cow elk aborts a calf on a Soda Lake feedground. Photo by Chris Colligan

population size and density were unrelated to seroprevalence. The beginning and ending dates of the artificial winter feeding season varied among feedgrounds and years, but brucellosis seroprevalence was associated only with the end date of the feeding season. Feeding seasons lasted from 40 to 80 days longer during years with more snow (Fig. 1B). If these associations reflect causal mechanisms, shortening the length of the feeding season by 60 days, due to earlier snowmelt or altered management, would result in a drop in brucellosis seroprevalence of approximately two-thirds. Experimental field research is necessary to prove the causality of the relationships between feeding season length and brucellosis seroprevalence.

In a second line of research we are investigating whether stress and intestinal parasites may also be associated with supplemental feeding and promote brucellosis transmission or increase susceptibility. High levels of chronic stress are known to inhibit immune function, and many studies in humans suggest that helminth infections may affect the susceptibility to, or control of, intracellular pathogens like Brucella abortus or tuberculosis. Our preliminary data suggest that the chronic stress levels (as indicated by fecal glucocorticoids) are over 50% higher in artificially fed elk populations compared to unfed populations, and the number of helminth eggs released in the feces also varies between fed and unfed populations. Preliminary analyses suggest that fed elk appear to be shedding relatively more parasite eggs in early winter and less in early spring compared to unfed elk. In the future we will to investigate how variability among the feedgrounds with respect to population size and density may be affecting stress and intestinal parasites. In addition, we also hope to use GPS collars on elk to assess how individual differences in ranging behavior relate to disease exposure. These data will also help us to better assess the risks of commingling with livestock and how this may spatially and temporally.

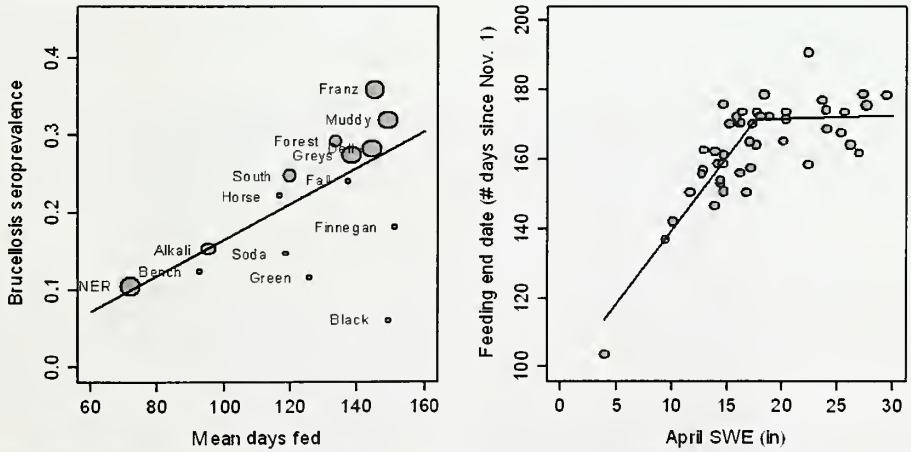


Fig. 1. (**A**) Mean seroprevalence of brucellosis increases with the length of feeding season in the 15 elk feedgrounds with over 30 elk tested for brucellosis (2064 total tests; *4*). Point size reflects the number of serological tests per feedground. The line is a linear regression weighted by the reciprocal of the estimated variance ($r^2 = 0.61$; $P < 0.0004$). (**B**) Averaging across sites, feeding end date was related to the amount of snow-water equivalent (SWE) remaining in April (*4*). The line is a segmented linear regression (r^2=0.7 for SWE<17 in, $n = 26$ years, $P < 0.0001$).

Brucella abortus survivorship during photopolymerization encapsulation

Rick Wallen

The traditional method of lyophilization and compaction of Brucella abortus vaccine, when formulated in to a ballistic delivery capsule was thought to create moderately high levels of mortality of the live vaccine. The purpose of this project has been to explore existing technologies to develop new methods of vaccine encapsulation that increase the probability of live vaccine surviving the rehydration process following ballistic delivery.

Collaborators at Colorado State University have suggested and tested a method using a photopolymerization process to encapsulate vaccine and package it in the chamber of an existing delivery projectile (manufactured by Ballistic Technologies Incorporated). This alternative process of encapsulation uses UV light to polymerize the vaccine into a gel followed by a lyophilization of the gel to reduce the size of the capsule. Experimental trials with a surrogate bacterium (Pseudomonas aeruginosa) demonstrated that the photopolymerization process causes very little mortality of the bacteria. Subsequent trails using B. abortus quantified that a dose of 1×10^{11} colony forming units (cfu) of RB51 vaccine when photopolymerized produced 1×10^{9} cfu of the bacteria surviving the encapsulation process . This method of encapsulation is feasible and results in production of a bio-bullet package that retains ballistic characteristics very similar to the traditional method of vaccine encapsulation.

The ballistic characteristics of the photopolymerized vaccine package loaded in to the commercially available thermo plastic bio-degradable projectiles (biobullets®) proved equally as accurate as the biobullets produced by the manufacturers (BTI). Hydrogel loaded bullets fired into the hindquarters of a live penned elk at 20 meters remained intact after air rifle firing. There were visible projectile tracts in the muscle and penetration into the muscle averaged 10 cm. Accuracy of the hydrogel loaded projectiles is within 13 cm of center aim at 20 meters distance.

Collaboration with Dr. Steven Olsen at the National Animal Diseases Center in Ames, Iowa lead to study trials comparing the immunologic response of the hydrogel formulated ballistic vaccines with the traditional compressed formulated ballistic vaccines. Preliminary information suggested that bison vaccinated with the hydrogel packaged projectiles exhibited similar immunologic response to bison vaccinated with syringe injections. This study is not yet completed as a challenge trial is scheduled for 2006.

Publications that describe these studies can be found in the 24th volume of Vaccine.

Improved Diagnostic and Molecular Epidemiological Tests for Brucellosis in Elk and Cattle

Amanda Fluegel

Brucellosis, caused by the bacterium Brucella abortus, is still a concern in Wyoming due to its endemicity in bison (Bison bison) and elk (Cervus elaphus) in the Greater Yellowstone Area and the loss of class free status for the state, although it is virtually eradicated from the rest of the United States. B. abortus is shed from an infected animal during calving or abortion and can be transmitted through contact with infected fetuses, fetal fluids, or vaginal exudates. Current diagnostic methods to identify infection in elk include serologic testing and culture, but neither method provides information about the infectious load of bacteria. Consequently, there is a need for more informative, sensitive, and rapid diagnostic tests. As part of the Wyoming Game and Fish brucellosis surveillance program, elk were trapped using corral traps and serologically tested for brucellosis on the Grey's River feedground in 2005 and on the Dell Creek, Muddy Creek, and Grey's River feedgrounds in 2006. Twenty-two cow elk aged e" 1.5 years from the feedgrounds were killed and necropsied. 40.9% (9/22) of elk seropositive for B. abortus antibodies, and 0.05% (1/19) fetuses were positive for B. abortus bacteria in culture. B. abortus isolates will be used for a molecular epidemiological study utilizing the HOOF-Print DNA fingerprinting technique to analyze Brucella strains present in the feedground elk. Characterization of Brucella strains can be useful in epidemiological trace back of disease outbreaks. The tissues collected during necropsy will be used to develop a new diagnostic real-time PCR assay to identify the presence of B. abortus in fresh tissues from elk and cattle. The assay will be developed further to distinguish biovar 1, 2, and 4. Development of new diagnostic tests and the information gathered from DNA fingerprinting can be used as tools to develop recommendations on how to prevent the spread of the disease.

A portable lab was used for serological testing. *Photo by Mark Gocke*

Idaho's Infected Cattle Herd

Gregory A. Ledbetter

Until recently, the state of Idaho has maintained a Brucellosis Free Status. This status was achieved in 1990 but was reduced to Class A on January 12, 2006. The loss of status was the result of a chain of events that began with the discovery of a brucellosis reactor cow that originated from Idaho. The cow was slaughtered on June 30, 2005, and sampled and tested in Utah through the USDA/APHIS/VS Market Cattle Identification program. Upon receipt of the positive MCI report on August 22, 2005, the cow was traced through her market back tag to a small, isolated, year-round calving beef herd in Swan Valley, Idaho. This was a long-standing herd subject to minimal management but with extensive sales and slaughter history. There had been no outside additions to the herd in many years and there was no fence line contact with other cattle at any time. There was, however, a history of feed line contact with brucellosis affected wild elk.

On October 7, 2005, staff from the Idaho State Department of Agriculture (ISDA) and United States Department of Agriculture (USDA) tested all (forty) of the test-eligible animals in the Swan Valley cattle herd for brucellosis. A total of eight reactors were identified. Twenty-three of thirty-eight cows were not vaccinated and the last brucellosis vaccination in this herd had been given in 1993.

ISDA investigators conducted a complete trace-out history on the herd covering the past five years. All the animals that had left the herd were identified and located. Many were steers, had been slaughtered, or were sent to terminal feedlots. Of all the intact animals that had left the index herd, only thirty were living and were all located on three premises in Idaho. Two heifer calves of 2005, one suspect and one reactor, were identified on separate premises.

The reactor heifer was approximately seven months of age and had not been exposed to a bull. Once all of the testing and culture requirements prescribed by USDA were completed, USDA determined that, although the reactor heifer was confined to a feed pen and highly unlikely to shed Brucella organisms, the fact that she was located on a premises other than the index premises constituted a second infected herd in Idaho and the state's brucellosis status was reduced to Class A.

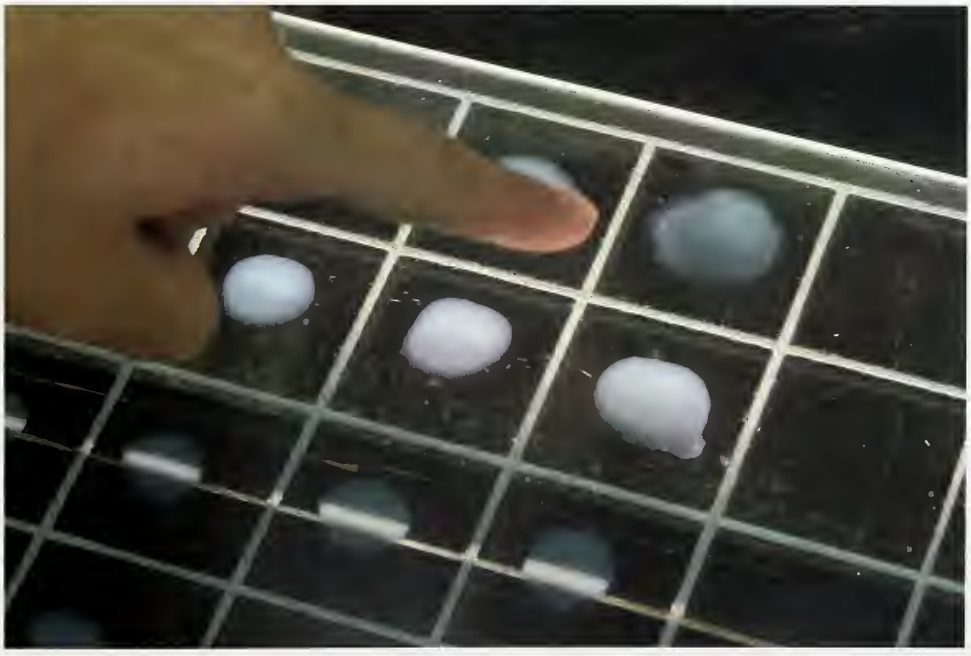
On December 6, 2005, forty-seven animals from the index herd, the suspect heifer, the reactor heifer and her herd-mates from the feed pen were shipped to Utah for slaughter at a USDA inspected establishment. Tissues for culture were collected from the reactor heifer and they were negative for the Brucella organism. The eight reactors from the index herd and three of their calves were sent to a USDA research facility for controlled study. Arrangements for indemnity payment and cleaning and disinfection of the premises were made between the herd owner and USDA.

In response to the discovery of the index herd, immediate action was taken by ISDA- Division of Animal Industries beginning in October of 2005. All cattle herds in the Swan Valley area were

scheduled for testing and verification of vaccination status. None of these herds had contact with the infected herd, but they may have been exposed to affected elk. All of these herds were quarantined and subsequently tested between 10/24/05-1/20/06. Of 1,197 animals, no reactors were identified during this round of area testing.

While testing in Swan Valley was being concluded, a Wildlife Brucellosis Working Group comprised of representatives from ISDA, IDFG, the Idaho Cattle Association, and the Idaho Farm Bureau Federation met and developed recommendations for addressing the brucellosis issue in Eastern Idaho.

Based on information provided by IDFG, a high risk area and surveillance buffer zones were designated in Eastern Idaho. The high risk area includes all elk herd units where any seropositive elk have been found. Eighty ranches from the high risk area were surveyed by ISDA and USDA personnel. Sixteen of these ranches were determined to be high risk for winter feed-line exposure to brucellosis affected wild elk. The sixteen ranches were all placed under a hold order until testing could be conducted. By June 20, 2006 fifteen herds and part of the sixteenth were tested, over 3500 animals, and no reactors were found. The sixteenth herd remains under hold order and will be tested in the fall of 2006.



Standard Plate test is uced to identify Brucella abortus. *Photo by Mark Gocke*

Idaho is addressing the brucellosis issue from two sides; expanded testing and vaccination of Idaho cattle and mitigation of elk-cattle interactions. The expanded testing and vaccination will consist of:

Strictly enforce IDAPA 02.04.20 "Rules Governing Brucellosis". This includes mandatory brucellosis vaccination requirements.

- Require adult booster vaccinations for herds in the high risk area.
- Allow adult vaccination by permit for selected animals.
- Require brucellosis testing of all test-eligible (sexually intact and 18 months or older) animals that leave the state.
- Increase Brucellosis Ring Testing of dairies from two to four times per year, and six times per year in the high risk area.
- Offer adult booster vaccinations for all other herds in Eastern Idaho.

Mitigation of elk-cattle interaction will include:

- Develop individual herd action plans to address wild elk/cattle feed-line contact.
- Strictly enforce IDAPA 02.04.25 "Rules Governing the Private Feeding of Big Game Animals". This rule prohibits feeding of big game animals in eastern Idaho.
- Provide fencing material to exclude wild elk from haystacks in the Eastern Idaho Big Game Winter Feeding Prohibition Zone.
- Working with Idaho Fish & Game to monitor elk-cattle interactions and private feeding of big game animals.
- Elimination of the Rainey Creek Elk Feedground as soon as possible
- Structuring elk management activities, including hunting seasons, to assist in preventing elk/cattle feed-line contact.

Pinedale Elk Herd Unit Test and Removal Pilot Project, Year One: Muddy Creek Feedground

Brandon Scurlock

Introduction

The Wyoming Game and Fish Department (WGFD) initiated the pilot project in response to a recommendation developed by the Governor's Brucellosis Coordination Team (BCT). The goal of this recommendation is to measure the potential reduction of brucellosis seroprevalence in elk and reduce the risk of brucellosis transmission from elk to cattle.

WGFD operates three elk feedgrounds within the Pinedale elk herd unit boundary. The Muddy Creek feedground was chosen as the first site within this herd unit to implement the effort. WGFD has committed to expand the pilot project to Fall and Scab Creek feedgrounds within the five-year period of winter 2005-2006 to winter 2009-2010.

BCT members determined capturing a large proportion of the total female elk within the feedground population as imperative for the success of the test and slaughter project. The existing permanent elk trap located on Muddy Creek feedground did not have the capacity to hold (~50' diameter main corral),

Cow elk await testing at the Muddy Creek Feedground *Photo by Mark Gocke*

and effectively process (4 handling chutes) large numbers of elk. Its purpose was for general brucellosis surveillance, and capturing up to 70 elk at a time was typical during its use. A larger trap was needed.

WGFD personnel began investigating various trap designs and manufacturers during spring 2005. TJ Welding, Inc. had experience constructing and operating portable elk traps for the Idaho Fish and Game Department on the Rainy Creek elk feedground. WGFD selected TJ Welding and worked with their professionals as well as a renowned animal behavior and facilities design consultant on the design, eventual construction and erection of a large portable elk trap. The trap was erected on Bridger Teton National Forest Lands at the Muddy Creek feedground during October 3-6, 2005.

Trapping

A trial run was determined necessary to ensure effectiveness of the new portable elk trap and familiarize personnel with trapping operations. A total of 35 elk were captured during this attempt (Table 1). All females, including juveniles, were bled and tested. Bleeding and testing juveniles significantly increased the amount of time required to work elk through the trap, increasing stress on captured animals, and past data collected by WGFD indicates low seroprevalence of brucellosis in juveniles. Thus, the decision was made to not sample juveniles during subsequent attempts.

On January 30, 2006, a total of 115 female elk were bled and tested, 43 of which were seropositive (Table 1). Two seropositive animals were killed, prior to delivery to the processor. One seropositive animal was not identified as a positive and was released (caught next trap effort). A total of 40 seropositive elk were slaughtered, processed, and packaged at the processor.

An additional trapping effort was determined necessary to increase the proportion of female elk tested from the feedground population. On February 16, 2006, a total of 124 elk were captured, including 40 female elk that had not been previously captured. The WGFD Diagnostics Lab crew began testing the 40 female elk blood samples upon arrival in Pinedale (Table 1).

Table 1. Numbers of female and male elk, recaptures, newly captured elk, total elk bled, and number of elk testing seropositive for exposure to brucellosis captured during three trapping efforts on the Muddy Creek Feedground, winter 2005-2006.

Trap Date	Females				Males				Recaptures	New Elk	Total Bled	# Sero +
	Adults	Yrlng	Juv	Total	Adults*	Yrlng	Juv	Total				
01/08/06	3	0	13	16	0	0	19	19	0	35	16**	0
01/30/06	107	9	39	155	2	7	44	53	18	206	115	43
02/16/06	39	1	22	62	1	2	6	9	53	44	40	15
TOTAL	149	10	74	233	3	9	69	81	71	285	171	58

*does not include 21 adult males chemically immobilized, reversed and released
**juveniles were bled

Results of 16 positive elk (includes one seropositive animal captured but released during the 1-16-06 effort) were made available to the sorting/shipping crew whom sorted the bled elk the next morning. A total of 14 seropositive elk were loaded onto one horse trailer and shipped to the processing facility. Two seropositive elk were inadvertently released back to the feedground population, where they were later killed and tissue samples were collected for laboratory analysis.

Meat Donation

A total of 54 seropositive elk were processed by the USDA approved slaughter facility in Idaho. Approximately 10,192 lbs of boxed and wrapped burger, steaks, and roasts were hauled via commercial refrigerated truck to a cold storage facility in Casper, Wyoming. Meat was then equally distributed among each WGFD Regional office and donated to the public on a first come-first served basis on April 12th, 2006.

Expenditures

A significant amount of time, effort and money were expended on the test and slaughter project during the first year. A total of 58 seropositive elk were removed from the population at a cost of approximately $5911/elk. Fifty-six of 58 seropositive elk were cultured with preliminary results (Table 2) indicating 18 were culture positive for Brucella. Subsequent culturing efforts may reveal additional culture positives, but these 18 elk were removed at a cost of $19,047/elk.

Culture Results

Fifty-six of the 58 seropositive elk have been cultured to date. Of the 56, 31 had strong reactions (titers) on the 6 standard brucellosis serological assays. As a general rule, the higher the titer - the more likely the animal will be culture positive. During slaughter, lymph nodes most likely to harbor B. abortus were collected for culture and analysis. The results below (Table 2) are preliminary and are based only on cultures of fetal fluid and iliac lymph nodes.

A graduate student at the University of Wyoming is conducting an investigation of the relationship between serology and culture status from elk killed during the test and slaughter pilot project. The student is planning a thorough culture of the remaining elk tissues during summer/fall 2006, and may identify additional positives.

Table 3. Preliminary culture results from Muddy Creek feedground seropositive elk.

Trap Date	Total Elk Cultured	Total Fetuses Cultured	Positive Elk	Positive Fetuses
1/30/2006	42	35	12	0
2/16/2006	14	10	6	5
Total	56	45	18	5

Future Efforts

WGFD is committed to implementing the pilot test and slaughter project in the Pinedale elk herd unit for the 5-year period of winter 2005-2006 to winter 2009-2010. Results will be comprehensively analyzed after the duration of the effort to determine its affects on brucellosis seroprevalence within the elk herd and total costs. However, numerous logistical challenges pertinent to the mechanical success of the project still lie ahead.

Muddy Creek feedground is arguably the easiest of the three feedgrounds within the Pinedale elk herd unit on which to implement the effort. Access roads into Fall and Scab Creek feedgrounds are much longer in length and may present extreme snow removal challenges to keep roads passable. The successful implementation of efforts at Muddy feedground during winter 2005-06 required significant personnel resources. The WGFD plans to establish a statewide elk trapping crew for the remaining years of the pilot project in an effort to relieve the heavy workload experienced by personnel in the Jackson/Pinedale Region during winter. Compounding trapping efforts on two, and ultimately three feedgrounds may impact other job duties.

A complete report from the first year of the Pinedale Elk Herd Unit Test and Slaughter Pilot Project can be found at http://gf.state.wy.us/wildlife/Brucellosis/index.asp

Members of the public wait for donated meat at the Jackson Regional Game and Fish Office.

Photo by Chris Colligan

Interagency Bison Management Plan for the State of Montana and Yellowstone National Park

Pat Flowers, Tom Linfield, and Rick Wallen

Introduction

The Interagency Bison Management Plan (IBMP) established a federal/state partnership to jointly manage the Yellowstone bison population. The role each agency plays in implementing the IBMP is defined in the respective state and federal records of decision (ROD) and the subsequently established field operation procedures. The IBMP incorporates adaptive management principles, to continually improve management policies and practices by learning from the outcomes of operational programs. While the focus of the management strategy is to prevent bison from commingling with cattle, implementation of a comprehensive vaccination program and gaining a better understanding of the ecology of both bison and the bacteria Brucella abortus provide the mechanisms for effectively managing the risks of brucellosis transmission from bison to livestock.

Under the IBMP, agency personnel monitor the two main bison exit corridors designated as the northern and western Special Management Areas (SMA's). When necessary, bison within SMA's are hazed to appropriate management zones. When hazing is no longer effective, bison may be captured, tested for exposure to brucellosis, and sent to slaughter if they test positive. Bison that cannot be safely or effectively hazed or captured may be shot. Step 1 of the IBMP provides for opportunities of up to 100 seronegative bison to remain outside the park in specific management zones when cattle are not present.

Managing the Risk of Disease Transmission

Disease transmission risk is managed by preventing bison and cattle from commingling, by removing bison from lands that cattle will occupy, and by implementing both a cattle and a bison vaccination program. To prevent bison from commingling with cattle, bison are hazed to appropriately designated winter range when they are found in close proximity to cattle and, after April 1, if bison are observed in locations that cattle will occupy during the summer. A voluntary cattle vaccination program is established for livestock operators in Montana, and a mandatory vaccination program, funded by USDA, is established for producers grazing cattle in, or adjacent to the identified SMA's. Seronegative bison calves and yearlings captured during management operations are vaccinated and released.

One hundred and forty-two hazing operations were conducted during the year ending in June of 2006: 118 at the northern boundary (Table 1, Fig 1) and 24 at the western boundary (Table 1, Fig 2). Forty-three percent of hazing operations along the northern boundary involved mixed age and gender groups while at the western boundary mixed group hazing operations accounted for 54 percent of all hazing operations conducted.

Figure 1. Summary of hazing activities for managing bison at the northern boundary management area.

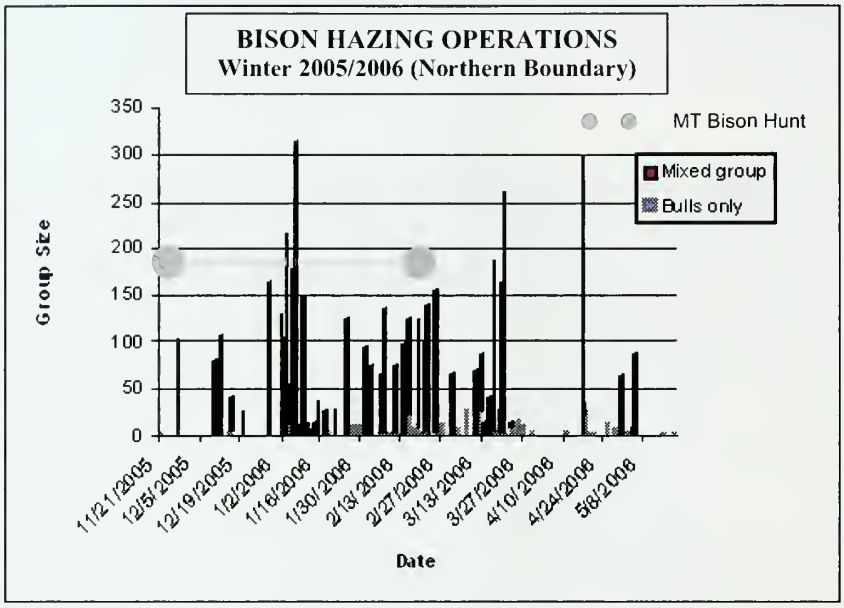
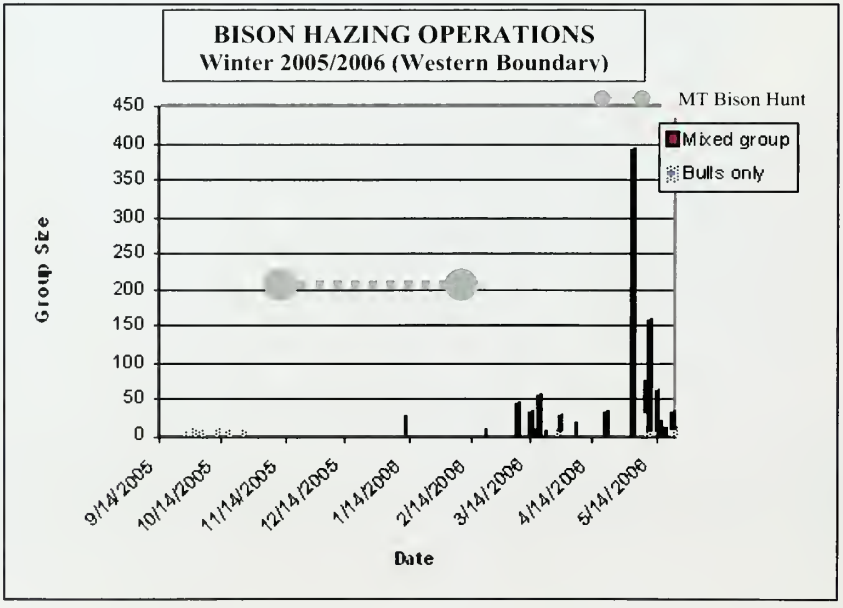


Figure 2. Summary of hazing activities for managing bison at the western boundary management area



Capture operations occurred at both SMA's during the period October 2005 to May 2006. 98 bison were captured and tested for brucellosis (Table 1), of which 87 were consigned to a quarantine feasibility research program after testing negative. Nine hundred and thirteen bison were killed as a result of management operations (899 consigned to slaughter following capture, eight mortalities occurred at capture pen facilities, and six were shot in the field).

Results from serological tests conducted on samples taken at slaughter facilities reveal that 43 % of the bison removed by management actions tested sero-positive for brucellosis.

Bison Vaccination Programs

Vaccination of calf and yearling bison is limited to those individuals that are handled at the two boundary area capture facilities. During this reporting period no bison were vaccinated and released.

Vaccination and Surveillance of Livestock

Brucellosis testing and vaccination of livestock managed near or adjacent to the special management areas along the northern and western boundaries of YNP continued during the 2005/2006 season. Entire herd tests were conducted in five cattle herds, including three in the western boundary area and two in the northern boundary area. All of the cattle tested were sero-negative. All vaccination-eligible cattle managed within the special management areas were verifed as being official vaccinates (Brucella abortus strain 19 or strain RB51). Entire herd adult vaccination (Brucella abortus strain RB51) was conducted in two cattle herds, both in the northern boundary area.

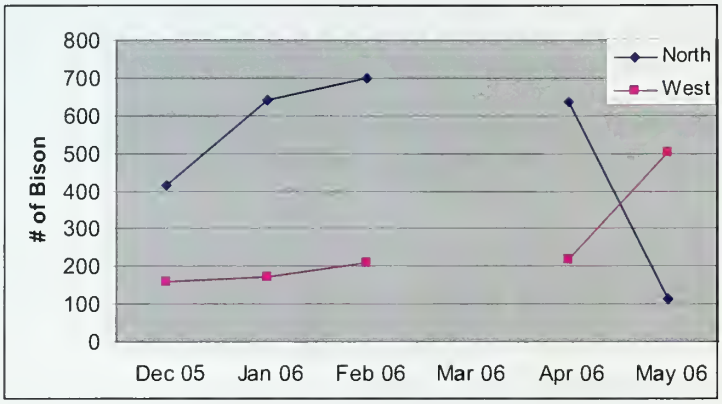
Monitoring Abundance and Distribution

Bison abundance and distribution within and adjacent to the SMA's were monitored through monthly surveys conducted from November to May depending on suitable weather conditions. The area of coverage is based on the monitoring needs as described in the interagency field operating procedures (December 2003). Population estimates are conducted twice per year in mid summer and in early winter.

During the winter season November 2005 to May 2006 bison abundance peaked in the northern SMA in February (700 bison) as compared to a peak of activity in the western SMA in May (502 bison) (Figure 2).

An August 2005 aerial survey of bison population abundance resulted in an estimate of 4876 individuals. A February 2006 aerial survey of abundance resulted in an estimate of 3546 bison.

Figure 3. Bison abundance in the Northern and Western Special Management Areas during winter operations.



Bison Hunting Program

Montana's first bison hunt in 15 years ended on February 15, 2006, with 40 bison being harvested by hunters. The 90-day season began on November 15, 2005, after the Montana Fish, Wildlife and Parks Commission authorized 50 permits. Sixteen of the 50 permits were allotted to Montana Native American hunters as authorized by state law. General permit hunters harvested 34 bull bison during the 90-day season, while tribal hunters harvested 5 bulls and 1 cow. Hunting took place primarily in the Eagle Creek area north of Yellowstone National Park with 32 of the 40 bison taken there, and eight in the West Yellowstone Basin area. The bison hunt was temporarily halted several times during the season to accommodate limited agency hazing of bison as agreed to under the IBMP prior to the hunt. Hunters were given a 24-hour notice of closure prior to actual closure. The temporary closures did not appear to limit any hunter's opportunity to harvest a bison, and every effort was made to maintain an opportunity to hunt in another hunting area during a closure. Very few hunters were warned or cited for non-compliance with hunting rules and regulations. Hunters were asked to submit blood samples for routine brucellosis surveillance. Eighteen of 25 usable samples submitted tested seropositive for brucellosis. In addition to the state bison hunt, Idaho's Nez Perce Tribe exercised its right under the 1855 Nez Perce Treaty to hunt bison on their historical and traditional hunting grounds outside of Yellowstone National Park in Montana. Nez Perce tribal hunters harvested 6 bison north of Yellowstone in the Eagle Creek drainage. The Montana Fish, Wildlife and Parks Commission authorized a 2006 season set to begin November 15.

Conclusion

The wild bison population of the northern Greater Yellowstone Area remains free ranging, reproductively vigorous, and genetically important for conservation of the species in North America. In addition, successful implementation of the IBMP allowed the livestock operations in and adjacent to special management areas along the northern and western boundaries of Yellowstone National Park to remain brucellosis-free, thereby maintaining Montana's brucellosis Class Free status.

INTERAGENCY BISON MANAGEMENT PLAN - October 1, 2005 thru June 1, 2006				
MANAGEMENT ACTIVITY	**LOCATION**			**TOTALS**
	West Boundary --outside park--	**North Boundary --inside park--**	**North Boundary --outside park--**	
Brucellosis Risk Management				
Hazing				
Number of hazing operations	24	87	31	142
Mortality during hazing activity	2	0	0	2
Capture				
Number of capture operations	4	8	0	12
Total Bison Captured	59	1249	0	1308
Released (Not tested)	9	305	0	314
Transported to Slaughter (Not tested)	50	838	0	888
Transported to Slaughter (Tested)	0	11	0	11
Capture Pen Mortality	0	8	0	8
Lethal Removal - Agency shooting	4	1	1	6
Subtotal Brucellosis Risk Mgt Mortalities	**56**	**858**	**1**	**915**
Research Removal - APHIS/FWP Quarantine	**0**	**87**	**0**	**87**
Montana Bison Hunt				
Licensed hunts	8	0	32	40
Nez Perce treaty hunt	0	0	6	6
Subtotal Hunting Mortality	**8**	**0**	**38**	**46**
Traffic Mortality (see notes 1 & 2 below)	**15**	**4**	**0**	**19**
Estimated Natural Mortality & Predation (see note 3 below)	**10**	**440**	**0**	**450**
Total Bison Removals & Mortalities	**89**	**1389**	**39**	**1517**

1 - estimated 15 mortalities on Highway 191

2 - known four traffic mortalities across YNP

3 - estimated across entire park from historic overwinter mortality and predation rates (440 ~ 9% of early-winter population of ~ 4,900 bison)

Tri-state Livestock Surveillance and Risk Analysis

Ryan Clarke and Arnold Gertonson

The foundation of cattle surveillance in the three state GYA is the Market Cattle Identification (MCI) system. The MCI is a national surveillance system administered by APHIS in partnership with the individual states. Under the MCI system all cattle and domestic bison over two years of age have a blood sample collected at slaughter. These samples are then subjected to the standard battery of serological tests for B. abortus antibody at an approved diagnostic laboratory. Test reactors or suspects are brought to the attention of the appropriate animal health officials in the animal's state of origin.

Each state in the GYA has its own cattle surveillance program to supplement the MCI system. This program varies from state to state depending upon the types of livestock operations in that state's portion of the GYA and the state's Brucellosis status (Class Free, Class A, etc.).

Montana regularly tests the cattle that graze in the immediate vicinity of Yellowstone National Park, those areas designated by the Interagency Bison Management Plan as Zone 2 and the Eagle Creek SMA. The intention is to eventually test and adult vaccinate all the cattle in those portions of the GYA on a regular basis.

Cattle/elk commingling is a risk factor thats considered in herd plan development.

Photo by MarkGocke

Idaho lost its Brucellosis Free status in January 2006 due to events associated with a wild elk to cattle transmission event. This has prompted the creation of an Action Plan for eastern Idaho which calls for testing cattle that over-winter in designated areas, testing cattle that have feed-line contact with elk, continued Brucellosis Ring Testing (BRT) of area dairy farms, renewed emphasis on testing eligible cattle being exported, and increased attention to the MCI program These activities coupled with increased adult cattle vaccination, enforcement of the big game feeding ban, strategic fencing and the creation of individual herd action plans are tools Idaho is using to decrease the risk of transmission.

Wyoming's surveillance program is based on its designation as a Class A state. The state incorporates such measures as change-of-ownership testing, testing of test-eligible cattle going interstate, increased emphasis on testing of aborted fetuses and the testing of certain cattle herds on a voluntary basis as tools in building a case for regaining Class Free status. Voluntary adult vaccination, cooperation in reporting cattle/elk commingling, and the creation of individual herd plans are also activities being used to address risk of transmission.

Beginning in late 2004 the three states and APHIS began discussions about using a risk assessment matrix as a means of identifying untested livestock operations in the GYA that may have significant risk for brucellosis transmission from wildlife. The risk matrix incorporates exposure factors that were involved in recent known transmissions of brucellosis from wildlife to cattle. Producers would have their level of risk assessed through the voluntary application of a standard questionnaire. All three states have begun to use questionnaires with producers in their portions of the GYA to gauge risk and in some cases to create herd plans. Those operations having a high proportion of risk factors in common with cases of known transmission would be candidates for increased surveillance.

Review of Brucellosis Surveillance in Montana 2006

Mark Atkinson, Neil Anderson, and Jesse Mikita

Elk

Brucellosis is known to exist at low levels in the elk herds of southwestern Montana. Brucella abortus biovar 1 was cultured from five seropositive research elk in 1988, a single adult in 1991 and from an aborted fetus in 2005. The disease remains a concern to domestic livestock producers in Montana because of the potential for it to be transmitted from wildlife to domestic animals. The Montana Fish, Wildlife and Parks (MFWP) Wildlife Research Laboratory conducts annual serologic surveys for exposure to B. abortus in elk populations within the greater Yellowstone Area (GYA) as outlined in the Montana Elk Brucellosis Management Plan. Surveillance is performed in three designated Elk Management Units (EMU): Emigrant, Gallatin and Madison. Samples are collected voluntarily by hunters and by veterinary and laboratory personnel during ongoing research programs that involve the handling of wild elk. Despite aggressive efforts to collect blood through hunter participation the number of usable specimens obtained has been unremarkable in recent years and has limited the certainty of results due to small sample size.

Surveillance conducted from 2004 to 2006 indicated an apparent increase in the seroprevalence of B. abortus in elk in the Madison EMU, located to the west of Yellowstone

Helicopter darting of elk in the Madison Valley. *Photo by Mark Atkinson*

National Park, from an average of 1.2% in prior surveys (1990–2003) to 6.9% in 2004/05 and 17.5% in 2005/06. Opportunistic surveillance of elk harvested from the Pioneer Mountains in 2005/06 indicated B. abortus exposure despite this herd being located well outside the Greater Yellowstone Area (GYA). These unexpected findings in addition to the generally increasing apparent seroprevalence levels prompted further investigation. Banked serum from reactor and suspect samples from both 2004-05 and 2005-06 seasons was submitted for retesting using the Western Immunoblot test. This test revealed that antibodies to the bacterium Yersinia enterocolitica O:9 had yielded a high percentage of false positive results in the standard serologic tests used to detect exposure to B. abortus.

Accounting for false positive results, brucellosis seroprevalence for the Madison EMU in both the 2004-05 and 2005-06 surveys was recalculated and found to average 1.9%, similar to that observed prior to 2004. From a total of 35 samples obtained from the Emigrant EMU in 2005/06, 2 samples were found to be positive on standard serologic tests. These seropositives were retested using WB; one was found to be positive for Yersinia only and one was positive for both Yersinia and Brucella (i.e. 3.2% seropositive). Seroprevalence for the Pioneer Mountains was 0%. The epidemiological significance of Y. enterocolitica O:9 in Montana's elk herds is currently unknown and warrants further investigation.

Based on these findings, the Montana Brucellosis Epidemiologic Review Committee made the following recommendations:

- Western Immunoblot be incorporated into the testing protocol for all seropositive and sero-suspect elk in Montana.
- Surveillance within the GYA will continue on an annual basis and be based on the population segment recommendations made for the Madison EMU, but remain adaptable depending on available information and surveillance needs.
- While recognizing that strong scientific evidence supports serology as an accurate indicator of exposure to B. abortus in bison, investigation of similar cross-reactivity in serologic surveys in this bison is recommended.
- An Elk Brucellosis Coordination Committee to be created to discuss issues regarding brucellosis surveillance in elk. This committee to replace the Epidemiologic Review Team, now no longer required following the reclassification of serology results (i.e. B. abortus seroprevalence in free-ranging elk herds in Montana remains <5%).

Table 1. 2005-06 Madison EMU results from serologic survey and western immunoblot (WB) testing for brucellosis. Madison EMU divided into four herd units: Flying D, Jack/Cedar Creek, Shell Creek/Quake Lake and West Yellowstone.

	FLYING D	JACK/ CEDAR	SHELL/ QUAKE	WEST YELL.	TOTAL
Total number of Samples	16	16	102	3	137
Seropositive	5	2	16	1	24
Seropositive Samples to WB	5	2	16	1	24
Brucella + Yersinia by WB	0	0	2	0	2
Yersinia only by WB	5	2	14	1	22
Sero-suspect	0	0	6*	0	6
Sero-suspect Samples to WB	0	0	4	0	4
Yersinia only by WB	0	0	4	0	4
Total Positive (% pos.)	0 (0%)	0 (0%)	2 (2.0%)	0 (0%)	2 (1.5%)

*Additional serum was not available for retesting two sero-suspects. As a result WB was not performed.

Bison

The State of Montana allocated 50 either-sex hunting licenses for bison in 2005/2006. A total of 40 bison were harvested, of which 39 were male and 1 was female. From these animals a total of 36 blood samples, collected by the hunters, were received by the Wildlife Laboratory for analysis. 25 of these were suitable for serologic testing and were submitted to the state Veterinary Diagnostic Laboratory. 18 were classified as reactors (72% seropositive).

A seronegative pregnant bison monitoring program was initiated in 2000 to mitigate for the release of pregnant bison from capture facilities in Montana west of Yellowstone National Park. Seronegative bison identified as pregnant during capture operations were fitted with radio collars to track their movements. These individuals were also fitted with vaginal implant transmitters designed to be expelled at parturition thereby enabling the location of parturition or abortion sites. In 2005, 21 radio-collared animals were monitored and possible birthing sites sampled. The study allowed documentation of high probability zones of parturition and improved knowledge of spatial patterns of habitat use by bison following release from capture facilities. No seronegative pregnant bison were monitored in 2006.

Bears

During the spring, summer and fall seasons, MFWP Wildlife Laboratory in cooperation with the Interagency Grizzly Bear Study Team (IGBST) and other bear researchers or bear management personnel, collects blood samples from grizzly and black bears captured within the GYA. In 2005/2006 a total of 16 blood samples from black bears and 26 blood samples from grizzly bears were submitted to the state Veterinary Diagnostic Laboratory for brucellosis testing. Of these, a total of 4 black bear and 13 grizzly bear samples were found to be positive on standard serologic tests indicating 25% and 50% seropositivity for black bears and grizzly bears respectively. The epidemiological significance of these finds is not fully understood but the results are consistent with prior surveys of bears within the Yellowstone ecosystem.

Radio-collared bison outside Yellowstone National Park. *Photo by Mark Atkinson.*

Wyoming BFH Program and BMAP Update

Brandon Scurlock

The Wyoming Game and Fish Department's integrated brucellosis management program (Brucellosis-Feedground-Habitat; BFH) is aimed at reducing the prevalence of brucellosis in elk. A total of 531 elk were trapped or darted and tagged on 7 feedgrounds over 20 trap days during the 2006 trapping season. A total of 318 test-eligible female elk were bled for brucellosis evaluation. An adequate (85% confidence) sero-sample was achieved on 4 of the 7 feedgrounds surveyed. Dell Creek feedground continues to serve as a "control" population as no vaccination has taken place since inception of the vaccination program at the Greys River feedground in 1985.

Strain 19 calfhood vaccination was again very successful this winter with a majority of the feedgrounds reporting 100% calfhood coverage. Many feedgrounds reported over 100% coverage, which suggests yearling females were boosted at several areas. A total of 2,859 calves were vaccinated on 19 state feedgrounds. The strain 19 vaccination program on the National Elk Refuge was again conducted in 2006, being initiated for the first time during 2003 since 1989-1991. Vaccination efforts were extremely successful this winter. A total of 909 calves were vaccinated during a 42-day period.

BFH personnel continued to facilitate implementation of habitat improvements projects this past year by coordinating with federal land management agencies. The Fremont Phase II treatment was conducted in Sublette County near the Soda Lake feedground with 1330 acres burned in the spring of 2005. Nearly 5000 acres of habitat treatments have occurred around the Soda Lake feedground since 1991. Since then, Soda Lake feedground experienced a 43-day mean decrease in duration of the annual feeding season, which is significantly more than the mean decrease observed on other feedgrounds during the same period. Habitat treatments implemented near Soda Lake appear to have reduced dependency of elk on supplemental feed, and, potentially, intra-specific disease transmission events.

The Maki Creek project was initiated in spring 2005 with 120 acres of pre-treatment conifer cutting in preparation for aspen burns scheduled for fall of 2006. This project targets rejuvenating decadent, conifer-encroached aspen stands near the Jewett elk feedground. BFH personnel have assisted with area delineations, data collection, and secured funding for the project through a successful grant proposal to the Wyoming Habitat Grant Trust for $60,000. Coordination meetings with federal agencies continued throughout the year to implement future projects. Monitoring of ongoing projects continued throughout the year including vegetation sampling and analysis.

The top recommendation of the Wyoming Governor's Brucellosis Coordination Team final report was the development of elk herd unit Brucellosis Management Action Plans (BMAP).

These plans collate all existing elk, feedground, and brucellosis management information, and present recommendations developed in consultation with local cattle producers, state and federal wildlife and livestock regulatory officials, and federal land managers that minimize risk of disease transmission from elk to cattle. The Pinedale, Fall Creek, Afton, and Upper Green River elk herd unit BMAP's were completed in 2006. The Hoback and Piney BMAP's are currently in progress, and the Jackson plan will commence in January 2007. All elk herd unit BMAP's will be completed by July 2007. BMAP development and their mandated annual updating will likely involve tremendous time commitments from the BFH work unit into the foreseeable future.

A final activity of the BFH program this year was the initiation of a novel feedground elk research project investigating Brucella-induced abortion ecology, brucellosis transmission risk variables, and parturition site characteristics of feedground elk using vaginal implant transmitters (VIT's). Elk were darted with 1.0ml Carfentanil and 0.5ml Xylazine from the feed sled on Bench Corral, Scab Creek, and Soda Lake feedgrounds. An 85% confident sero-sample size was achieved on Bench and Soda, where brucellosis seroprevalence was considerably lower (12% and 15%, respectively) than the feedground elk average of 26%. A total of 83 elk were darted, 89% of cows were pregnant, we had 3 capture mortalities, and implanted 70 VIT's.

VIT's were monitored regularly after elk left the feedgrounds, with increased intensity during parturition. Expelled transmitters were collected and will be cultured at the WGFD Veterinarian Diagnostics Lab in Laramie to determine presence/absence of Brucella. Habitat evaluations were conducted at each site of expelled transmitters in attempt to quantify environmental characteristics selected for by calving elk. Results have not yet been compiled or anaylzed. The study will be conducted again next year.

Elk were preg-checked before fitted with a VIT. *Photo by Chris Colligan*

GYIBC Serology Working Group

Ryan Clarke

This group was created by the GYIBC technical subcommittee at the fall 2004 GYIBC meeting. The members are Ryan Clarke (Chair), Don Davis, Hank Edwards, Phil Mamer, Glenn Plumb, and Tom Roffe. Guest contributors have included Keith Aune, Walt Cook, Jack Rhyan, Phil Elzer, and Steve Hennager.

It was given the following the following objectives/tasks:

1) **Establish guidelines for testing elk and bison serum for brucellosis in the GYA**
   a) What standard tests available today are the most useful tests.
   b) What tests could be applied in experimental fashion (FPA, PCR, etc.).

2) **Provide guidelines for sampling elk and bison given several scenarios:**
   a) To determine presence/absence in a wildlife population.
   b) To establish trends in sero-prevalence from a wildlife population.
   c) To determine the distribution of affected populations in the GYA

3) **Provide guidelines for reporting and evaluating sero-prevalence that can be applied as a standard in the GYA**
   a) Standard reporting for various age and sex classes.
   b) Standard reporting for feedground/nonfeedground animals.
   c) Standard reporting for bison/elk.

The through a series of e-mails and a final meeting at USAHA consensus was reached on many guidelines. The major recommendations have been collated and now await final review and approval by the GYIBC technical subcommittee in December 2006.

Bison and Elk Management Plan and EIS for the National Elk Refuge and Grand Teton National Park

Laurie Shannon

The U.S. Fish and Wildlife Service and National Park Service, as the lead agencies, in cooperation with Wyoming Game and Fish Department, U.S. Forest Service, Animal and Plant Health Inspection Service, and Bureau of Land Management, are preparing a Bison and Elk Management Plan (Plan) and Environmental impact statement (EIS) for the National Elk Refuge and Grand Teton National Park. The agencies anticipate publishing the Final Plan/EIS in late 2006. In accordance with the National Environmental Policy Act of 1969, the Regional Directors for both the U.S. Fish and Wildlife Service and the National Park Service will issue a Record of Decision no sooner than 30 days after the Federal Register notice for the Final Plan/EIS has been published. The Record of Decision will disclose the alternative selected for implementation and the reasons for its selection. A final stand-alone management plan is anticipated to be completed by late spring 2007.

The Draft Management Plan and EIS was available for public review from July 21, 2005 to November 7, 2005. In late August, 2005, the agencies held a series of public open houses and formal hearings in Bozeman, Montana, Jackson, Wyoming, and Riverton, Wyoming. The meetings were conducted as public hearings, which allowed individuals to provide comments which were recorded by a court reporter. In addition to the public hearing testimony, public comments on the Draft Plan/EIS were also received in the form of letters, emails, form letters, and petitions. During the comment period, the agencies received over 11,900 written comments and public testimony from individuals, agencies or organizations, and form letters or petitions.

While many issues were raised during the comment period, most of the concerns and issues were related to the following topics:

- Population management
- Habitat management
- Supplemental feeding
- Native American tradition and history
- Disease
- Public use and economics
- Legal mandates and jurisdiction

Comments received on the Draft Plan/EIS and the agencies' responses to comments will be documented in the Final Plan and EIS. The responses will include copies of the letters submitted by government agencies, organizations and businesses with the Service's response printed beside each letter. Additionally, substantive comments made by the public will be summarized and addressed with specific responses. After the Final Plan/EIS is published, public comments and responses will also be available for review at the National Elk Refuge office in Jackson, Wyoming.

Park-wide Remote Delivery Vaccination Program for Bison in Yellowstone National Park

Rick Wallen

Yellowstone National Park has been conducting an environmental impact study to evaluate the feasibility of implementing a program to remotely vaccinate bison against brucellosis throughout their range of distribution on park lands. The purpose of this program is to implement a strategy to lower the percentage of bison susceptible to brucellosis infection. Remote delivery is distinguished from hand delivery that occurs in capture pens at or near the park boundary when bison leave the park. Remote delivery would not involve capture and handling of individual animals.

A December 2000 Record of Decision resulting from the interagency bison management plan for the state of Montana and Yellowstone National Park noted that the remote vaccination of eligible bison with an effective and safe vaccine would contribute to a population level increase in immunity against Brucella abortus.

An environmental planning process has been ongoing since August of 2004 when a Notice of Intent to Prepare an Environmental Impact Statement was published in the Federal Register.

The park conducted four public meetings in September 2004 to gather public comment and assess public interest in this issue. No new issues were discovered through public scoping. Consultation with the 26 associated American Indian tribes was initiated in December of 2004. Eighty-four other tribes interested in bison management issues at Yellowstone were notified of the planning process and queried about their interest in the vaccination program. The National Park Service is currently studying the input provided by public scoping and the consultation process.

A variety of alternatives have been considered by NPS staff preparing the documentation. The draft EIS will focus on analysis of a no action alternative and two action alternatives. The service is currently preparing a draft Environmental Impact Statement documenting the results of the study. The formal internal agency review should begin in September 2006. Following agency review Yellowstone National Park will publish a notice of availability in the Federal Register and open a public comment period for further review by interested constituency groups.

USAHA Special Committee on Brucellosis in the GYA

Rick Willer and Tom Linfield

The United States Animal Health Association (USAHA), through it's Special Committee on Brucellosis in the Greater Yellowstone Area (GYA), sponsored a working symposium to identify the research needs and costs for the development of vaccines, vaccine delivery systems and diagnostics to address brucellosis (Brucella abortus) in bison and elk. The working symposium was held August 16-18, 2005, at the University of Wyoming in Laramie. The University of Wyoming's Helga Otto Haub School and William D. Ruckelshaus Institute of Environment and Natural Resources served as the facilitator of the symposium, utilizing primary funding provided by the United States Departments of the Interior and Agriculture. The Greater Yellowstone Interagency Brucellosis Committee, through the states of Idaho, Montana, and Wyoming, helped sponsor the working symposium. A total of 43 participants from the United States and three foreign countries (Canada, Russia, and New Zealand) attended the working symposium. Participants were selected based upon their scientific expertise in the areas of vaccine development, delivery methods, and diagnostics. These experts, along with over 80 Special Committee members and key stakeholders from the United States and Canada successfully identified several areas for further research to address the challenges of brucellosis in the GYA. The highest priority research needs in each of the three areas of discussion follow.

Vaccine Development:

- Empirical or applied research – There is a need to establish a protocol to rapidly screen new vaccine candidates for efficacy in bison and elk. Currently available brucellosis vaccines must be immediately utilized in preclinical efficacy studies and field-testing in bison and elk.

- Discovery or basic research – There is also a need to expand our knowledge of pathogenesis, protective antigens, and immunologic responses to B. abortus in bison and elk. If vaccines evaluated with empirical approaches prove unacceptable, then the knowledge gained through the basic research approach might offer alternative vaccine solutions. Several key areas were identified within this approach:
    - Reproducible disease models for bison and elk
    - Surrogates of protective immunity
    - Host specific immunologic responses
    - Antigen discovery
    - Continual adjuvant/formulation/delivery optimization
    - Novel B. abortus genetically-engineered vaccines
    - Durability of immunogenicity

The costs associated with the research needs in vaccine development depended upon the research approach. It was estimated that to develop and license a promising vaccine would cost approximately $10M. To conduct further research on existing vaccines would cost approximately $400,000-$500,000 per study per species over a period of 1-2 years.

Vaccine Delivery Systems:

- The highest priority research areas for delivery systems are:
  - Oral baits – methods that require an animal to ingest the vaccine
  - Biocompatible bullets – the vaccine is delivered directly to the subcutaneous tissues or deeper
  - Natural forage dispersed vaccine – utilizes a dispersed antigen externally applied to natural forage
  - Transdermal – any method that delivers a vaccine by direct absorption through or into epidermal tissues
- The selection of these delivery methodologies for use in bison and elk in the GYA is based upon the following assumptions:
  - A delivery system is heavily dependent on the vaccine type
  - Existing systems need additional development
  - Due to the complexity of brucellosis in the GYA, multiple platforms for delivery may be necessary
  - Social and ecological considerations are a must to gain public acceptance
  - A system must be cost effective with the ability to access large numbers of animals
  - Appropriate funding must be available to adequately develop the delivery system
  - Field validation trials must be conducted.

Diagnostics:

- There is a need to validate the existing diagnostic methods that are applied to wildlife. Although originally developed for cattle, many of the current diagnostic tools have been extrapolated for use in wildlife. The World Organization for Animal Health (OIE) standards for validation could be used as a guide.

- There is a need to establish a clearinghouse for sharing information that also identifies a process for sharing reagents, contains a master database, and maintains a repository for well-characterized diagnostic materials.

The following priorities were categorized by the time necessary to reasonably accomplish the goal:

Short-term (1-2 years)

- Meta-analysis of the current data through the incorporation of existing publications as well as unpublished findings to determine the existing base of knowledge on diagnostic tests for brucellosis.
- Standardization of the Polymerase Chain Reaction (PCR)

Intermediate term (2-5 years)

- Biomarkers
- Vaccine Markers
- Matrix Antibody/Antigen

Long term (5-10 Years)

- Rapid diagnostic tests (genomics and proteomics)

The costs associated with accomplishing the highest priority research needs in the development of diagnostic tools were estimated at $28-$52M. Host genomics were considered separately, and the estimated cost of this research would add $30M to the overall cost.

Crosscutting Issues:

- There is a need to establish a collaboration consortium to facilitate and oversee the brucellosis research efforts on bison and elk. This oversight group will assist in identifying and procuring funds, prioritizing research, and coordinating multidisciplinary research teams.

- There is also a need to evaluate how to facilitate this research since brucellosis is designated as a select agent (i.e., listed by the Center for Disease Control and Prevention as having the potential to pose a severe threat to public health and safety). Currently, this designation makes it very difficult to conduct the research necessary to address the brucellosis challenge.

- Additionally, there is a need to identify the facility needs to conduct the necessary research. Currently, facilities for brucellosis research that can house several large animals for long periods of time in a Bio-Safety Level 3 Ag environment do not exist in the United States.

The working symposium was a significant step in the long journey to address the brucellosis challenge in the GYA. It was the first time that technical experts from around the world were assembled with the specific task of addressing the vaccine, vaccine delivery and diagnostic challenges of bison and elk in the GYA. The participants willingly shared their thoughts and ideas, and their efforts have established a course of action.

A technical report, as well as a roadmap for improved vaccines, vaccine delivery, and testing for brucellois, developed following the working symposium can be accessed at: http://www.usaha.org/pubs/index.shtml#GYA

Triennial Public Meetings, Website, Annual Report, and GYIBC News

Chris Colligan

There were fewer opportunities for public participation in the GYIBC during the past year than in prior years of the committee. With the tragic loss of Tom Thorne, one of the founding members of the GYIBC, the meeting following his untimely death was postponed. The GYIBC held three regular meetings during the time period of this annual report, in Idaho Falls, ID, Bozeman, MT, and Jackson, WY. All were open for public attendance and comment. The final two meetings were held with a shortened one-day format, mostly due to a lack of agenda items. Despite the shorter meetings, public participation and interest in brucellosis continues to be high. All of the meetings have had continued attendance by regular participants, as well as new faces at each meeting. Many of the member agencies are also addressing public participation through projects that are in detail within this annual report.

The second annual report of the GYIBC was completed and distributed at the October 2005 meeting of the committee. All of the past and present annual reports are available on website. It was also decided at the October meeting that the subcommittee no longer pursue a newsletter. The rationale behind a newsletter is currently being addressed through the annual report, news article circulation, and website. An additional link was added to the webpage to include agency news, where member agencies brucellosis related news releases could be posted, as well as any articles voluntarily submitted by a member agency. At this time, no voluntary articles have been submitted, and there is no apparent need for a newsletter.

Since 2004, articles have been electronically distributed to GYIBC members and interested publics to forgo the distribution of paper copies of news articles that are collected throughout the course of the year. This news distribution list, known as "GYIBC news", is a compiled database of email addresses from meeting sign-in sheets. There are approximately 150 readers of GYIBC news. This tool has reduced costs of paper and copying significantly as well as made for timely dissemination of brucellosis information. This has also been a useful tool for member agencies to distribute news releases on brucellosis related events.

The GYIBC website continues to be improved as a vehicle for disseminating brucellosis-related information to the public. The website has seen increased use over the past three years of its existence. Between 2004 and 2005, website usage increased by over 10,000 page views (Figure 1). The website can be viewed at: http://gyibc.com/

Despite perhaps a declining interest in the GYIBC by member agencies, interest in brucellosis by affected stakeholders and the public at large continues throughout the GYA. Brucellosis

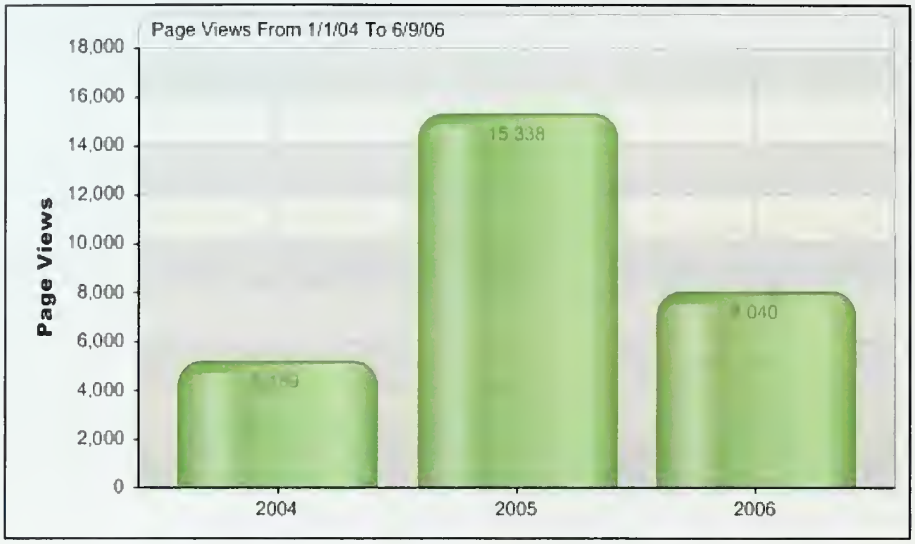


Figure 1: Number of times GYIBC.com has been viewed since 2004.

research and management activities headline regional newspapers weekly. The sharing of technical information that occurs within this annual report and at triannual meetings is still crucial and often forgotten by participating members. As is shown by research and management actions, there continues to be a need for sharing knowledge between agencies to address the goals of "collectively identifying and implementing equitable solutions to concerns about brucellosis in the Greater Yellowstone Area (GYA) while moving towards the elimination of the disease that is not native to wildlife." Committee members must also remember the value of the triennual meetings as a public forum for concerned publics to communicate their concerns on wildlife and livestock interests alike.

Update on Montana Bison Hunt and Education Efforts

Melissa Frost

Beginning on November 15, 2005, thirty-four Montana sportsmen and women got the chance to participate in a unique hunting experience. With the start of Montana's first bison hunt in 15 years, these hunters pursued their quarry with the whole world watching. Media outlets from across the United States and the world converged near Gardiner and West Yellowstone, Montana, to document the hunt.

A seventeen-year-old from Belgrade, Montana, was the first to harvest a bison. He was literally swarmed by print, radio, and television journalists scrambling to capture the images and emotions of the hunt.

The hunt ended successfully on February 15, 2006, with 40 bison harvested during the 90-day season. The general public, all Montana hunters, filled 34 tags and six Montana Native American hunters harvested bison under legislation passed by the 2005 Montana Legislature. After the close of the hunt, Montana Fish, Wildlife and Parks evaluated the season and gathered input from hunters and the public. Comments from hunters, including feedback on a mandatory orientation session prior to hunting, were overwhelmingly positive.

Blood sampling conducted by the FWP Wildlife Laboratory in Bozeman revealed 18 of 25 usable samples were seropositive for brucellosis.

On August 3, 2006, the Montana Fish, Wildlife and Parks Commission approved a bison hunt for the 2006 season. This year, the Commission increased the number of permits to 140, which will be issued by special drawing to in-state and out-of-state hunters who apply. In a change from the 2005 season, the hunt area has been broken out into two distinct areas west and north of Yellowstone National Park. Each hunt area will include four time periods. In addition to the either-sex permits issued last year, 45 of the 140 permits issued will be cow/calf only. Hunters will again be required to particpate in an orientation session prior to hunting.

For more information about the hunt and bison management and conservation in Montana, visit http://fwp.mt.gov/hunting/bison.html.

2005 GYIBC ANNUAL REPORT

**Written by members of the Executive Committee,
Technical, and Information Education Subcommittees**

Idaho Department of Fish and Game • Montana Department of Fish, Wildlife and Parks • Wyoming Game and Fish Department • Idaho Department of Agriculture
Montana Department of Livestock • Wyoming Livestock Board • U.S.D.A. Forest Service • U.S.D.A. Animal and Plant Health Inspection Service • U.S.D.A. Agricultural Research Service
U.S.D.I. Fish and Wildlife Service • U S.D.I. National Park Service • U.S.D.I. Bureau of Land Management • U.S.D.I. National Biological Service

GYIBC is available on the Internet. Access the GYIBC Home Page by pointing your web browser to: http://gyibc.com

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GYIBC

Greater Yellowstone Interagency Brucellosis Committee

Cover Photo: Human Encroachment on Elk Winter Range, by Mark Gocke